

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: ATSUSHI HOHKITA ET AL.

Serial No.: NOT YET ASSIGNED

Filed: August 30, 2001

Title: EXHAUST GAS TURBINE FOR INTERNAL COMBUSTION
ENGINE AND EXHAUST TURBO-SUPERCHARGER

PRELIMINARY AMENDMENT

Box Fee Amendment

August 31, 2001

Commissioner for Patents
Washington, D.C. 20231

Sir:

Please enter the following amendments to the claims prior
to the examination of the application.

IN THE SPECIFICATION:

Page 12, line 10 through page 13, line 7, substitute the
following paragraph:

FIG. 12 shows an example of control of the exhaust bypass
valve during a running state of a vehicle. During the period from
starting operation to idle operation of the internal combustion
engine, the exhaust bypass valve is totally opened by judging
that the accelerator pedal angle is zero and the engine speed is

an idle setting rotation speed. During acceleration running, the exhaust bypass valve is totally closed by judging from increasing rates of the accelerator pedal angle, the engine speed and the vehicle speed. Since the turbine is matched so that the low speed torque may become maximum, the acceleration performance of the vehicle can be improved compared to that in the prior art. During acceleration running, fine angle control of the exhaust bypass valve is performed in order to prevent a shock caused by shifting of the speed change gear. During constant speed running, the exhaust bypass valve is nearly totally opened to decrease the turbine inlet pressure and to improve the fuel consumption rate by judging from increasing rates of the accelerator pedal angle, the engine speed and the vehicle speed. During deceleration running, the exhaust bypass valve is totally closed by judging that the accelerator pedal angle is maximum and the engine speed is the idle setting rotation speed. As described above, by controlling the exhaust bypass valve so as to change between the operating mode requiring supercharging and the operating mode not requiring supercharging, it is possible to match operation of the exhaust bypass valve with operation of the internal combustion engine which makes the fuel economy and the power performance optimum.

IN THE CLAIMS:

Please amend claims 3-5, 7, 14-19, 24-28 and 45 as follows:

(A copy of the marked-up version of amended claims 3-5, 14-19, and 24-28 and 45 are attached to this Preliminary Amendment).

3. (Amended) An exhaust gas turbine for an internal combustion engine according to claim 1, which comprises an open/close valve which is arranged in said exhaust gas catalyst inlet port or in an inlet of said exhaust gas passage guiding the exhaust gas into said catalyst.

4. (Amended) An exhaust gas turbine for an internal combustion engine according to claim 1, wherein a supercharger disposed in an intake air passage of said internal combustion engine is attached so as to be driven by said turbine.

5. (Amended) An exhaust gas turbine for an internal combustion engine according to claim 1, wherein an electric

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generator of said internal combustion engine is attached so as to be driven by said turbine.

7. (Amended) An exhaust gas turbine for an internal combustion engine having a waste gate valve which is attached together with a catalyst to an exhaust passage of said internal combustion engine, wherein said waste gate valve is constructed so as to be kept open during a starting period of operation of said engine to directly guide exhaust gas into said catalyst.

14. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, wherein an exhaust manifold and said turbine case are integrated as a unit.

15. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, wherein said turbine case is of a double wall structure forming a hollow inside a wall of said turbine case.

16. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, which comprises:

an intake air bypass flow passage, said intake air flow passage connecting a compressor case inlet flow passage for guiding intake air into said compressor impeller with a compressor outlet flow passage for guiding the intake air passed through said compressor impeller; and

an intake air bypass valve and a valve seat in said intake air bypass flow passage.

17. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, wherein a movable part forming a compressor case R-profile opposite to a blade outer peripheral R-profile of said compressor impeller is movable in an axial direction of said turbine shaft.

18. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, wherein a driving actuator of said exhaust bypass valve is driven by a motor.

19. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to any claim 1, wherein a solenoid valve is used for a driving actuator of said exhaust bypass valve.

20. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 11, wherein a driving actuator of said intake air bypass valve is driven by a motor.

21. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 11, wherein a solenoid valve is used for a driving actuator of said intake air bypass valve.

24. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 11, wherein said exhaust bypass valve is kept open during a starting period of operation of said internal combustion engine.

25. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 16, wherein said intake bypass valve is kept open while said exhaust bypass valve is kept open.

26. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 17, wherein said movable part forming the compressor case R-profile opposite to

the blade outer peripheral R-profile of said compressor impeller is kept apart from the blade outer peripheral R-profile of said compressor impeller while said exhaust bypass valve is kept open.

27. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 24, wherein while said exhaust bypass valve is kept open during a starting period of operation of said internal combustion engine, an amount of fuel is controlled so that temperature of the exhaust gas may be increased by making an air-to-fuel ratio rich.

28. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 11, wherein catalyst is placed inside a flow passage of said turbine case outlet.

45. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim 1, wherein an exhaust gas inlet portion of said exhaust bypass flow passage and said turbine outlet are connected by a straight pipe, and said exhaust gas bypass valve is opened during a starting period of operation of the internal combustion engine to make exhaust gas flow by bypassing said turbine.

Please add the following new claims:

46. (New) An exhaust gas turbine for an internal combustion engine according to claim 2, which comprises an open/close valve which is arranged in said exhaust gas catalyst inlet port or in an inlet of said exhaust gas passage guiding the exhaust gas into said catalyst.

47. (New) An exhaust gas turbine for an internal combustion engine according to claim 2, wherein a supercharger disposed in an intake air passage of said internal combustion engine is attached so as to be driven by said turbine.

48. (New) An exhaust gas turbine for an internal combustion engine according to claim 2, wherein an electric generator of said internal combustion engine is attached so as to be driven by said turbine.

49. (New) An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein an exhaust manifold and said turbine case are integrated as a unit.

50. (New) An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein said turbine case is of a double wall structure forming a hollow inside a wall of said turbine case.

51. (New) An exhaust turbo-supercharger for an internal combustion engine according to claim 12, which comprises:

an intake air bypass flow passage, said intake air flow passage connecting a compressor case inlet flow passage for guiding intake air into said compressor impeller with a compressor outlet flow passage for guiding the intake air passed through said compressor impeller; and

an intake air bypass valve and a valve seat in said intake air bypass flow passage.

52. (New) An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein a movable part forming a compressor case R-profile opposite to a blade outer peripheral R-profile of said compressor impeller is movable in an axial direction of said turbine shaft.

53. (New) An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein a driving actuator of said exhaust bypass valve is driven by a motor.

54. (New) An exhaust turbo-supercharger for an internal combustion engine according to any claim 12, wherein a solenoid valve is used for a driving actuator of said exhaust bypass valve.

55. An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein a driving actuator of said intake air bypass valve is driven by a motor.

56. An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein a solenoid valve is used for a driving actuator of said intake air bypass valve.

57. An exhaust turbo-supercharger for an internal combustion engine according to claim 12, wherein said exhaust bypass valve is kept open during a starting period of operation of said internal combustion engine.

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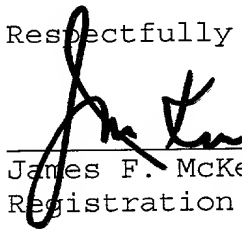
REMARKS

Entry of the amendments to the Specification and claims before examination of the application is respectfully requested.

If there are any questions regarding this Preliminary Amendment or this application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Crowell & Moring, L.L.P., Deposit Account No. 05-1323 (Docket #381NP/50238).

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

FIG. 12 shows an example of control of the exhaust bypass valve during a running state of a vehicle. During the period from starting operation to idle operation of the internal combustion engine, the exhaust bypass valve is totally opened by judging that the accelerator pedal angle is zero and the engine speed is an idle setting rotation speed. During acceleration running, the exhaust bypass valve is totally closed by judging from increasing rates of the accelerator pedal angle, the engine speed and the vehicle speed. Since the turbine is matched so that the low speed torque may become maximum, the acceleration performance of the vehicle can be improved compared to that in the prior art. During acceleration running, fine angle control of the exhaust bypass valve is performed in order to prevent a shock caused by shifting of the speed change gear. During constant speed running, the exhaust bypass valve is nearly totally opened to decrease the turbine inlet pressure and to improve the fuel consumption rate by judging [form] from increasing rates of the accelerator pedal angle, the engine speed and the vehicle speed. During deceleration running, the exhaust bypass valve is totally closed

by judging that the accelerator pedal angle is maximum and the engine speed is the idle setting rotation speed. As described above, by controlling the exhaust bypass valve so as to change between the operating mode requiring supercharging and the operating mode not requiring supercharging, it is possible to match operation of the exhaust bypass valve with operation of the internal combustion engine which makes the fuel economy and the power performance optimum.

IN THE CLAIMS:

Please amend claims 3-5, 7, 14-19, 24-28 and 45 as follows:

3. (Amended) An exhaust gas turbine for an internal combustion engine according to [any one of claims 1 and 2] claim 1, which comprises an open/close valve which is arranged in said exhaust gas catalyst inlet port or in an inlet of said exhaust gas passage guiding the exhaust gas into said catalyst.

4. (Amended) An exhaust gas turbine for an internal combustion engine according to [any one of claims 1 to 3] claim 1, wherein a supercharger disposed in an intake air passage of

said internal combustion engine is attached so as to be driven by said turbine.

5. (Amended) An exhaust gas turbine for an internal combustion engine according to [any one of claims 1 to 3] claim 1, wherein an electric generator of said internal combustion engine is attached so as to be driven by said turbine.

7. (Amended) An exhaust gas turbine for an internal combustion engine [having a waste gate valve which is attached together with a catalyst] having a waste gate valve which is attached together with a catalyst to an exhaust passage of said internal combustion engine, wherein said waste gate valve is constructed so as to be kept open during a starting period of operation of said engine to directly guide exhaust gas into said catalyst.

14. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 to 13] claim 11, wherein an exhaust manifold and said turbine case are integrated as a unit.

15. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 to 13] claim 11, wherein said turbine case is of a double wall structure forming a hollow inside a wall of said turbine case.

16. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 to 15] claim 11, which comprises:

an intake air bypass flow passage, said intake air flow passage connecting a compressor case inlet flow passage for guiding intake air into said compressor impeller with a compressor outlet flow passage for guiding the intake air passed through said compressor impeller; and

an intake air bypass valve and a valve seat in said intake air bypass flow passage.

17. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 to 15] claim 11, wherein a movable part forming a compressor case R-profile opposite to a blade outer peripheral R-profile of said compressor impeller is movable in an axial direction of said turbine shaft.

18. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 and 13 to 17] claim 11, wherein a driving actuator of said exhaust bypass valve is driven by a motor.

19. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to any [one of claims 11 and 13 to 17] claim 11, wherein a solenoid valve is used for a driving actuator of said exhaust bypass valve.

20. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim [16] 11, wherein a driving actuator of said intake air bypass valve is driven by a motor.

21. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to claim [16] 11, wherein a solenoid valve is used for a driving actuator of said intake air bypass valve.

24. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11 and 13 to 17] claim 11, wherein said exhaust bypass valve is kept

open during a starting period of operation of said internal combustion engine.

25. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims] claim 16[, 20, 21 and 24], wherein said intake bypass valve is kept open while said exhaust bypass valve is kept open.

26. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims] claim 17[, 22 to 24], wherein said movable part forming the compressor case R-profile opposite to the blade outer peripheral R-profile of said compressor impeller is kept apart from the blade outer peripheral R-profile of said compressor impeller while said exhaust bypass valve is kept open.

27. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims] claim 24 [to 26], wherein while said exhaust bypass valve is kept open during a starting period of operation of said internal combustion engine, an amount of fuel is controlled so that temperature of the exhaust gas may be increased by making an air-to-fuel ratio rich.

28. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11, 13 to 27] claim 11, wherein catalyst is placed inside a flow passage of said turbine case outlet.

45. (Amended) An exhaust turbo-supercharger for an internal combustion engine according to [any one of claims 11, 13 to 17] claim 11, wherein an exhaust gas inlet portion of said exhaust bypass flow passage and said turbine outlet are connected by a straight pipe, and said exhaust gas bypass valve is opened during a starting period of operation of the internal combustion engine to make exhaust gas flow by bypassing said turbine.